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BEETLES FOUND IN WOODS TRASH DURING WINTER BOLL WEEVIL SURVEYS

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Summary

Samples of woods trash collected in the fall and spring in South Carolina were examined to determine the numbers of boll weevils (*Anthonomus grandis* Boheman) entering hibernation sites and surviving the winter. The material was also examined for all other species of beetles. Of

405 species found, representing 41 families of beetles, 35 species are well-known pests. Many others are from families that include serious pests. Twenty-one species of lady beetles (Coccinellidae) and over 100 species from families that are mostly predators on other insects were identified.

Introduction

The duff or woods trash on the forest floor has long been known as the principal hibernation quarters for the boll weevil (*Anthonomus grandis* Boheman). Since it has been a pest of cotton in the United States, efforts have been made to reduce its overwintering populations by winter burning

the woods trash. Bondy,² Beckham,³ and Fye et al.⁴ found that about 80 percent of the weevils

² BONDY, F. F. BOLL WEEVIL CONTROL IN THE SOUTH ATLANTIC STATES. U.S. Bur. Ent. and Plant Quar. E-431, 9 pp. 1938.

³ BECKHAM, C. M. HIBERNATING STUDIES OF THE BOLL WEEVIL IN RELATION TO A SMALL GEORGIA PIEDMONT COTTON FIELD. Jour. Econ. Ent. 50: 833-834. 1957.

⁴ FYE, R. L., McMILLIAN, W. W., WALKER, R. L., and HOPKINS, A. R. THE DISTANCE INTO WOODS ALONG A COTTON FIELD AT WHICH THE BOLL WEEVIL HIBERNATES. Jour. Econ. Ent. 52: 310-312. 1959.

¹ This report is technical contribution No. 799, Department of Zoology and Entomology, South Carolina Agricultural Experiment Station, Clemson. The senior author was formerly entomologist and professor of entomology, Clemson University Pee Dee Experiment Station, Florence, S.C.

hibernated within 200 feet of the edge of the woods near cotton-fields. Treating this area with insecticides or pathogens has been considered.⁵ However, little was known regarding other insects that might also be overwintering

in this ecological niche. Rainwater⁶ reported 201 species of beetles taken from woods trash during winter examinations. Since then, names have been changed and additional species have been found.

Methods

For many years people associated with cotton production have been informed each spring of the number of boll weevils entering hibernation and successfully overwintering in their area. This information is obtained routinely from late fall and early spring surveys of typical boll weevil hibernation sites by State and Federal agencies.

In South Carolina three areas, each consisting of three counties, were surveyed twice each year. Fifteen to 30 farm sites were chosen in each area, and three samples were taken from each location. A sample consisted of

all leaves and litter down to the soil surface on a 2-square-yard area in a wooded area adjacent to a cottonfield. In the laboratory this trash was processed through a power shaker where coarse material was separated from the finer particles. The fine material was spread in a thin layer on a 3-by 8-foot steel-topped table having a soil-heating cable beneath it. As the material became warm, most of the insects came to the surface where they could be hand-collected. From these surveys the 204 new records presented here were obtained.

Results and Discussion

Of the 405 species collected from woods trash, 35 are well-known pests.⁷ Little is known about the life histories of many

of the beetles. However, clues to their possible importance may be found from the general economics of the families to which they belong.

The following species were collected during the winter from woods trash in South Carolina:

⁵ WALKER, R. L., and HOPKINS, A. R. STUDIES ON THE CONTROL OF BOLL WEEVILS IN SURFACE WOODS TRASH. *Jour. Econ. Ent.* 49: 696-698. 1956.

⁶ RAINWATER, C. F. INSECTS AND SPIDERS FOUND IN SPANISH MOSS, GIN TRASH, AND WOODS TRASH, AND ON WILD COTTON. U.S. Bur. Ent. and Plant Quar. E-528, 20 pp. 1941.

⁷ The assistance of the many taxonomists who identified most of the species listed is gratefully acknowledged.

CARABIDAE

Carabus vinctus Webb¹
Notiophilus novemstriatus
 LeConte¹
Dyschirius globulosus Say
Clivina americana Dejean¹
Clivina bipustulata Fab.¹
Nomius pygmaeus (Dejean)¹
 (stink beetle)
Anillus dunavani Jeannel
Tachys vivax LeConte
Tachys laevus Say
Evarthrus sodalis (LeConte)
Loxandrus lucidulus minor
 (Chaudoir)
Loxandrus velox (Dejean)
Loxandrus parallelus Casey¹
Calathus opaculus LeConte¹
Agonum tenue LeConte¹
Agonum ferreum Haldeman
Agonum albicrus Dejean¹
Agonum octopunctatum Fab.¹
Agonum punctiforme Say
Amara musculi (Say)¹
Amara cupreolata Putzeys¹
Amara basillaris Say
Harpalus gemmeus Casey¹
Selenophorus opalinus LeConte¹
Anisodactylus rusticus Say¹
Anisodactylus nigerrimus Dejean¹
Anisodactylus laetus Dejean¹
Trichotichnus autumnalis (Say)¹
Acupalpus longulus Dejean¹
Acupalpus ochropezzus Say¹
Acupalpus indistinctus (Dejean)¹
Tachistodes testaceus (Dejean)¹
Badister reflexus LeConte¹
Leptotrachelus dorsalis Fab.¹
Colliuris pennsylvanica L.¹
Tetragonderus intersectus
 Germar¹
Lebia pulchella Dejean¹

Lebia viridis Say¹*Lebia ornata* Say¹*Lebia analis* Dejean¹*Lebia fuscata* Dejean*Dromius piceus* Dejean*Pinacodera limbata* (Dejean)¹*Pinacodera platicollis* Say*Apenes opaca* LeConte*Apenes sinuata* Say¹*Hellumorphoides nigripennis*Dejean¹

DYTISCIDAE

Liodessus fuscatus (Crotch)
Copelatus glyphicus (Say)

HYDROPHILIDAE

Cercyon haemorrhoidalis (Fab.)

STAPHYLINIDAE

Acidota crenata (Fab.)¹
Carpelimus bilineatus (Stephens)
Apredium schwarzi Fauvel
Thorscophorus fletcheri Wendeler
Osorius latipes (Gravenhorst)
Oxyporus occipitalis Fauvel
Stenus colon Say
Stenus carolinea Casey
Pinophilus opacus LeConte¹
Palaminus luteus Casey¹
Palaminus testaceus Erichson
Rugilus dentatus Say¹
Homaeotarsus bicolor
 Gravenhorst¹
Homaeotarsus badium
 Gravenhorst
Homaeotarsus pallipes
 Gravenhorst
Homaeotarsus cinctus Say¹
Lathrobium angulare LeConte¹
Lobrathium longiusculum
 Gravenhorst
Achenomorphus corticinus
 (Gravenhorst)¹

Astenus prolixus (Erichson)¹
Astenus binotatus (Say)
Gyrohypnus fuscipes (LeConte)
Gyrohypnus hamatus (Say)
Nematolinus longicollis LeConte
Diochus nanus Erichson
Erichsonius loxatus (Horn)
Erichsonius parcus (Horn)¹
Philonthus lomatus Erichson¹
Philonthus sordidus
 (Gravenhorst)¹
Belonuchus rufipennis Fab.
Staphylinus tomentosus
 Gravenhorst¹
Quediusholochinus
 (Gravenhorst)¹
Bolitobius cinctus
 Gravenhorst¹
Lordithon axillaris Gravenhorst
Lordithon dimidiatus (Erichson)
Bryoporus rufescens LeConte¹
Mycetoporus humidus Say
Mycetoporus consors LeConte¹
Mycetoporus americanus
 Erichson
Mycetoporus flavidus LeConte¹
Mycetoporus flavidus pictus
 Horn¹
Mycetoporus splendidus
 Gravenhorst
Tachyporus jocosus Say
Erchomus ventriculus (Say)
Erchomus laevis (LeConte)¹
Tachinus opicus Say
Tachinus pubescens Paykull¹
Tachinus crassus Gravenhorst
Tachinus parvulus (Horn)
Phanerota fasciata (Say)

PSELAPHIDAE

Trimiomelba dubia LeConte
Reichenbachia nr. *congener*
 Brendel

Arthmius prob. *gracilior* Casey
Batrishes globosus (LeConte)
Cercocerus batrishes LeConte
Tmesiphorus costalis LeConte
Adranes coecus LeConte

LEPTODIRIDAE

Nemadus horni Hatch
Ptomaphagus consobrinus
 LeConte¹

LEIODIDAE

Anisotoma expolita Brown

SCYDMAENIDAE

Euconnus affinis Casey
Napochus nr. *dentiger* (Casey)
Napochus clavatus (LeConte)
Napochus lynceus (Casey)
Napochus basale (LeConte)
Napochus lacunosus (Casey)
Napochus pumilus (Casey)
Napochus nr. *politus* (Casey)
Stenichnus perforatus (Schaum)
Chevrolatia amoena LeConte
Scydmaenus grossus (LeConte)

SCAPHIDIIDAE

Scaphidium quadriguttatum Say¹
Scaphidium quadriguttatum
 piceum Melsheimer¹
Cyparium flavipes LeConte
Eubaeocera mitchelli Cornell
Baeocera speculifer Casey¹

HISTERIDAE

Eusipho placidus Erichson¹
Platylomalus aequalis (Say)
Paromalus seminulum Erichson
Epierus pulicarius Erichson
Onthophilus alternatus Say¹
Hister rotundus Casey

Atholus sedecimstriatus Say¹
Phelister subrotundus Say¹

SCARABAEIDAE

Canthon nigricornis (Say)¹
Canthon probus (Germar)
Canthon bispinatus Robinson
Glaphyrocanthon viridis
 (Palisot de Beauvois)¹
Ateuchus histeroides Weber¹
Ateuchus lecontei (Harold)¹
Onthophagus subaeneus
 (Palisot de Beauvois)¹
Onthophagus hecate (Panzer)¹
Onthophagus striatulus
 (Palisot de Beauvois)¹
Onthophagus tuberculifrons
 Harold¹

Onthophagus concinnus Laporte¹
Aphodius stupidus Horn¹
Aphodius campestris Blatchley¹
Aphodius distinctus (Mueller)¹
Aphodius terminalis Say¹
Ataenius ovatus Horn¹
Ataenius strigatus (Say)¹
Ataenius simulator Harold¹
Ataenius erratus Fall¹
Ataenius platensis (Blanchley)¹
Pleurophorus parvulus
 (Chevrolat)¹
Pleurophorus atlanticus
 Cartwright

Ochodaeus musculus Say¹
Bolboceras darlingtoni (Wallis)¹
Bolboceras alabamensis (Wallis)¹
Trox variolatus Melsheimer
Trox erinaceus LeConte¹
Serica intermixta Blatchley¹
Serica sericea (Illiger)¹
Serica trociformis Burmeister¹
Serica carolina Dawson
Serica atricapilla Kirby¹
Serica aspera Dawson¹

Serica parallela Casey
Diplotaxis sordida Say¹
Diplotaxis liberta (Germar)¹
Diplotaxis excavata LeConte¹
Diplotaxis densicollis Fall
Anomala nigropicta canadensis
 Casey

HELODIDAE

Cyphon nebulosus (LeConte)
Cyphon padi L.
Cyphon pusillus (LeConte)

EUCINETIDAE

Eucinetus strigosus LeConte

BUPRESTIDAE

Dicera punctulata (Schönherr)
Chrysobothris chrysoela
 (Illiger)¹

ELATERIDAE

Conoderus auritus (Herbst)¹
Aeolus amabilis (LeConte)
Aeolus livens LeConte
Limonius plebejus (Say)
Limonius quercinus (Say)¹
Limonius aeger LeConte¹
Limonius basillaris (Say)¹
Athous ornatipennis LeConte
Sericus silaceus (Say)¹
Negastrius perplexus (Horn)¹
Glyphonyx recticollis (Say)¹
Glyphonyx testaceus
 (Melsheimer)¹
Glyphonyx quietus Say¹
Melanotus communis
 (Gyllenhal)¹
Melanotus insipiens (Say)¹
Cardiophorus angustatus
 Blanchley¹
Cardiophorus convexus (Say)
Horistonotus curiatus (Say)¹

EUCNEMIDAE

Melasis pectinicornis Melsheimer

CANTHARIDAE

Chauliognathus pennsylvanicus

De Geer (soldier beetle)

LYCIDAE

Dictyopterus mundus Say

ANOBIIDAE

Tricorynus confusus (Fall)*Caenocara oculata* (Say)¹*Caenocara inepta* Fall

TENEBRIONIDAE

Blapstinus metallicus (Fab.)¹*Crypticus obsoletus* (Say)¹*Uloporus ovalis* Casey*Platydema excavatum* (Say)*Platydema ruficolle*Laporte & Brullé¹*Platydema crenatum* LeConte¹*Platydema micans* Zimmerman¹*Latheticus oryzae* Waterhouse*Tribolium castaneum* (Herbst)¹
(red flour beetle)*Uloma imberbis* LeConte¹*Uloma punctulata* LeConte¹*Eutochia picea* (Melsheimer)*Dioedus punctatus* LeConte*Opatriinus minimum*

(Palisot de Beauvois)

Polypleurus geminatus Solier*Anaedus brunneus* (Ziegler)¹*Paratenetus fuscus* LeConte

ANTHICIDAE

Notoxus murinipennis LeConte¹*Notoxus monodon* (Fab.)¹*Tomoderus interruptus* Laferté*Tomoderus constrictus* (Say)¹*Tomoderus impressulus* Casey

EUGLENIDAE

Zonantes nubifer (LeConte)*Zonantes signatus* (Haldeman)¹

NITIDULIDAE

Colopterus unicolor (Say)¹*Colopterus truncatus* (Randall)*Carpophilus dimidiatus* (Fab.)
(corn sap beetle)*Carpophilus lugubris* Murray
(dusky sap beetle)*Carpophilus antiquus* Melsheimer¹
(antique sap beetle)*Carpophilus freemani* Dobson*Stelidota germinata* (Say)¹*Stelidota octomaculata* (Say)¹*Stelidota strigosa* (Gyllenhal)*Pallodes silaceus* Erichson¹*Pallodes pallidus*
(Palisot de Beauvois)*Epuraea lengi* Parsons

RHIZOPHAGIDAE

Monotoma americana Aubé

SPHINDIDAE

Sphindus americanus LeConte

CUCUJIDAE

Ahasverus advena (Waltl)*Ahasverus rectus* (LeConte)¹*Laemophloeus convexulus*
LeConte*Telephanus velox* Haldeman¹

CRYPTOPHAGIDAE

Toramus pulchellus (LeConte)

LANGURIIDAE

Languria mozardi mozardi
Latreille¹ (clover stem borer)

ENDOMYCHIDAE

Lycoperdina ferruginea LeConte¹*Aphorista vittata* (Fab.)¹*Mycetina perpulchra* Newman

<i>Danae testacea</i> Ziegler ¹	<i>Triplax thoracica</i> Say
<i>Stenotarsus hispidus</i> (Herbst)	CISIDAE
COCCINELLIDAE	
<i>Hyperaspis signata</i> (Olivier)	
<i>Hyperaspis proba</i> (Say) ¹	
<i>Hyperaspis paludicola</i> Schwarz	LATHRIDIIDAE
<i>Brachyacantha ursina</i> (Fab.)	
<i>Brachyacantha basalis</i>	
Melsheimer ¹	
<i>Stethorus punctum</i> (LeConte)	
<i>Scymnus (Pullus) fraternus</i>	
LeConte	COLYDIIDAE
<i>Scymnus (Pullus) chrompyga</i>	
Casey	
<i>Scymnus (Pullus) collaris</i>	
Melsheimer	
<i>Scymnus (Scymnus) americanus</i>	MYCETOPHAGIDAE
Mulsant ¹	
<i>Scymnus (Diomus) terminatus</i>	
Say	
<i>Scymnus loewii</i> (Mulsant)	
<i>Coleomegilla fuscilabris</i>	CERAMBYCIDAE
(Mulsant) ¹	
<i>Coleomegilla maculata</i> (De Geer)	
<i>Adalia bipunctata</i> (L.)	
(two-spotted lady beetle)	
<i>Neomysia pullata</i> (Say)	
<i>Cycloneda sanguinea</i> (L.) ¹	
<i>Cycloneda immaculata</i> (Fab.) ¹	
<i>Cycloneda munda</i> (Say) ¹	
<i>Epilachna borealis</i> (Fab.)	
(squash beetle)	
<i>Epilachna varivestis</i> Mulsant ¹	
(Mexican bean beetle)	
EROTYLIDAE	
<i>Tritoma sanguinipennis</i> Say ¹	
<i>Tritoma affinis</i> Lacordaire ¹	
<i>Tritoma angulata</i> Say ¹	
<i>Tritoma humeralis</i> Fab. ¹	
<i>Tritoma erythrocephala</i>	
Lacordaire ¹	
CHRYSOMELIDAE	
<i>Donacia subtilis</i> Kunze ¹	
<i>Lema trilineata</i> (Olivier)	
(three-lined potato beetle)	
<i>Griburius scutellaris</i> (Fab.)	
<i>Cryptocephalus venustus</i> Fab.	
<i>Cryptocephalus schreibersi</i>	
Suffrian	
<i>Cryptocephalus tinctus</i> LeConte	
<i>Chlamisus gibbosa</i> (Fab.) ¹	
<i>Colaspis brunnea</i> (Fab.) ¹	
<i>Graphops varians</i> LeConte ¹	
<i>Xanthonia decemnotata</i> (Say)	
<i>Myochrous denticollis</i> (Say)	
<i>Myochrous floridanus</i> Schaeffer ¹	
<i>Paria canella</i> (Fab.) ¹	
<i>Paria aterrima</i> (Olivier) ¹	
<i>Paria gilvipes</i> Horn ¹	
<i>Paria opacicollis</i> LeConte	

Paria pratensis Balsbaugh
Paria fragariae Wilcox
 (strawberry rootworm)
Calligrapha scalaris (LeConte)
 (elm calligrapha)
Hydrothassa obliquata (LeConte)
Ophraella sexvittata (LeConte)
Ophraella notulata (Fab.)¹
Pyrrhalta rufosanguinea (Say)¹
Diabrotica undecimpunctata howardi Barber¹ (southern corn rootworm, spotted cucumber beetle)
Acalymma vittata (Fab.)¹
 (striped cucumber beetle)
Cerotoma trifurcata (Forster)¹
 (bean leaf beetle)
Kuschelina petaurista (Fab.)
Capraita sexmaculata (Illiger)¹
Capraita quercata (Fab.)¹
Capraita obsidiana (Fab.)¹
Capraita circumdata (Randall)¹
Capraita scalaris (Melsheimer)¹
Disonycha caroliniana (Fab.)¹
Disonycha triangularis (Say)
 (three-spotted flea beetle)
Disonycha glabrata (Fab.)¹
Disonycha admirabilis Blatchley¹
Strabala rufa (Illiger)¹
Crepidodera nana (Say)¹
Epithrix fuscula Crotch
 (eggplant flea beetle)
Epithrix hirtipennis
 (Melsheimer)
 (tobacco flea beetle)
Mantura floridana Crotch
Chaetocnema denticulata (Illiger)
 (toothed flea beetle)
Chaetocnema confinis Crotch¹
 (sweetpotato flea beetle)
Longitarsus melanurus
 (Melsheimer)

Phyllotreta zimmermanni
 (Crotch)
Psylliodes punctulata Melsheimer
 (hop flea beetle)
Sumitrosis rosea (Weber)
Chalepus bicolor (Olivier)¹
Baliosus ruber (Weber)¹
 (basswood leaf miner)
Octotoma plicatula (Fab.)
Glyphuroplata porcata
 (Melsheimer)
Deloyala guttata (Olivier)¹
 (mottled tortoise beetle)
Agroiconota bivittata (Say)¹

BRUCHIDAE

Meibomerus musculus (Say)

ANTHRIBIDAE

Araecerus fasciculatus (De Geer)
 (coffee bean weevil)
Trigonorhinus sticticus
 (Boheman)¹
Toxonotus lividus (LeConte)
Tropideres fasciatus (Olivier)

CURCULIONIDAE

Pantomoris cervinus (Boheman)¹
 (Fuller rose beetle)
Otiorhynchus ovatus (L.)
 (strawberry root weevil)
Cercopaeus chrysorrhoeus (Say)¹
Cercopaeus strigicollis Sleeper
Cercopaeus maspavancus Sleeper
Pantomorus cervinus (Boheman)
Pandeleteius hilaris (Herbst)
Cyrtepistomus castaneus
 (Roelofs) (Asiatic oak weevil)
Listronotus costirostris obliquus
 (Klug)¹ (vegetable weevil)
Listronotus prob. sordidus
 (Gyllenhal)
Listronotus caudatus (Say)

Hyperodes delumbis Gyllenhal
Hylobius pales (Herbst)¹
 (pales weevil)
Smicronyx sculpticollis Casey
 (dodder gall weevil)
Apion prob. decoloratum Smith
Cimberis elongatus LeConte¹
Pterocolus ovatus Fab.¹
Tachypterellus quadrigibbus
 (Say)¹ (apple curculio)
Anthonomus scutellaris LeConte
 (plum gouger)
Anthonomus grandis Boheman¹
 (boll weevil)
Anthonomus suturalis LeConte¹
Anthonomus flavidicornis Boheman
Conotrachelus nenuphar (Herbst)
 (plum curculio)
Conotrachelus albicinctus
 LeConte¹
Conotrachelus affinis Boheman
Conotrachelus seniculus LeConte
Conotrachelus elegans (Say)¹
Conotrachelus naso LeConte¹
Conotrachelus posticatus
 Boheman¹
Conotrachelus cribricollis (Say)¹
Conotrachelus anaglypticus
 (Say)¹
Conotrachelus erinaceus LeConte
Chalcodermus aeneus Boheman¹
 (cowpea curculio)
Chalcodermus inaequicollis Horn¹
Chalcodermus collaris Horn¹
Acalles clavatus Say
Tyloderma fragariae Riley
 (strawberry crown borer)
Micralcinus maculata
 (Blatchley)¹
Cryptorhynchus obliquus Say
Cryptorhynchus tristis LeConte
Lechriops oculatus (Say)¹
Craponius inaequalis (Say)
 (grape curculio)

Acanthoscelidius curtus (Say)
Acanthoscelidius acephalus Say
Auleutes tenuipes (LeConte)
Ceutorhynchus rapae Gyllenhal¹
 (cabbage curculio)
Ceutorhynchus rufipes LeConte
Ampeloglypter longipennis Casey
Glyptobaris lecontei Champion
Centrinaspis picumnus (Herbst)¹
Oligolochus ornatus Casey¹
Sitophilus zeamais Motschulsky¹
 (larger rice weevil)
Sphenophorus parvulus
 (Gyllenhal)¹
 (bluegrass billbug)
Rhodobaenus tredecimpunctatus
 (Illiger)¹

SCOLYTIDAE

Cnesinus strigicollis LeConte
Pagiocerus frontalis (Fab.)
Hypothenemus obscurus (Fab.)
 (apple twig beetle)
Hypothenemus interstitialis
 (Hopkins)
Hypothenemus dissimilis
 (Zimmerman)
Monarthrum mali (Fitch)

¹ Reported by Rainwater (see footnote 6).

Of the 53 species of chrysomelids found, 14 are so well known as plant pests that they have been given common names. Many of the others are classed as flea beetles, leaf miners, root-worms, and leaf feeders.

Curculionids are represented by 54 species, 16 of which are known by common names. Most of the species in this family feed on plants or their fruit. They are some of our most destructive

pests, including the boll weevil and the plum curculio.

Staphylinids and carabids are represented by 50 and 47 species, respectively. Few of these have been given common names, but most of them are beneficial, because they are generally predators on other insect species, both as adults and as larvae.

Most of the 39 species of scarabs collected belong to the group of dung or carrion feeders, although species of *Serica*, *Diplostaxis*, and *Anomala* feed on plant roots.

The 21 species of coccinellids found in woods trash include the Mexican bean beetle and the squash beetle, which are notorious leaf feeders. The other species are classed as beneficial insects, since both larvae and adults feed on a variety of mites, aphids, scale insects, and other soft-bodied insects.

Several of the 18 species of elaterids collected live in dead trees, where some of them are predatory. However, since the larvae of certain species of the family are rather damaging to underground parts of agricultural products, some of the species found in trash samples could possibly be injurious also.

Tenebrionids have a wide range of food items, including stored products, animal wastes, rotting vegetation, and growing plants. Most of the 17 species included here feed on fungi or other mat-

ter beneath the bark of dead trees.

Most nitidulids feed on rotting vegetation and fungi, although some are predatory on other insects. Several of the 12 species collected are pests on such fruits as peaches and grapes and on vegetables such as sweet corn.

Eleven species of scydmaenids were found, but since members of this family live in ant nests, under dead tree bark, in woods trash, and under stones, no pest species are known.

The eight species of histerids listed could undoubtedly be considered beneficial, since both larvae and adults of most species in this family are predators, living in the soil or under dead tree bark and feeding on such insect pests as cutworms, fly larvae, and weevil larvae.

The seven pselaphid species found are normal inhabitants of woods trash, where they feed on other minute creatures or are fed by ants.

The six species of erotylids collected are associated with fungi. The six species of scolytids usually attack dead or dying trees or shrubs, feeding on the bark and wood. The adults also feed on shoots of live trees and shrubs, and some are carriers of disease from infected to healthy trees.

Five species were collected from each of the following three families. Little is known about the scaphidiids, but probably these species feed on fungi be-

neath or on trees. Larvae of anthicids live in vegetable detritus and the adults are found on flowers and foliage. The larvae of at least one species in the family are predatory. The endomychids are generally found under dead tree bark or on decaying fruit, where they feed on molds and fungi.

Each of the following two families was represented by four species. The cucujids include some species whose larvae are predators, but most feed on decaying plant material or stored products. The anthribids feed on fungi, usually under tree bark or in stored products.

The next two families were

each represented by three species. The helodids are not likely to be pests, since the larvae are aquatic and the adults are seldom found. The anobiids include several pests of stored products and wood, but the species found in woods trash are not known to be numerous enough to become damaging.

Of the 27 species belonging to 20 additional families, only two are considered economically important. A languriid, *Languria mozardi* Latreille, damages the stems of clover and other legumes, and the larvae of a cantharid, *Chauliognathus pennsylvanicus* De Geer, are predacious and were found in all areas surveyed during the winter.

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